COST ANALYSIS OF AN INSTITUTIONAL TOKEN MOTIVATIONAL SYSTEM

An abstract of a thesis by
Thomas J. Howley
August 1973
Drake University

The problem: An analysis was performed on the cost and effectiveness of a token motivational system in a state hospital.

Procedure: A token economy program, designed and implemented by a multidisciplinary team, attempted to motivate 48 retarded residents to perform 27 self-help skills and 51 work tasks. Six weeks of residents' baseline performance was compared to the effects of eight weeks of treatment programming. Cost break-outs of the total treatment cost for direct and indirect treatment cost, three stages of program development and a comparison of the monthly ward cost with and without the treatment program were performed.

Findings: The treatment program was effective in increasing the self-help and work behaviors. The various cost break-outs indicated that: (a) professional and non-professional time was reallocated cost to the system, (b) the only major additional cost to the system was supplies, (c) the dollar cost for operating a large number of projects was relatively small.

Conclusion: A behavior modification program fulfills the requirements for a Program-Planning-Budgeting-System analysis and makes possible an evaluation of the cost and effectiveness of a residential treatment program.

Recommendations: Future research should be directed toward developing more useful empirical cost data collection procedures.

A COST ANALYSIS OF AN INSTITUTIONAL TOKEN MOTIVATIONAL SYSTEM

A Thesis

Presented to

The School of Graduate Studies

Drake University

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

---

by

Thomas J. Howley

August 1973

A COST ANALYSIS OF AN INSTITUTIONAL TOKEN MOTIVATIONAL SYSTEM

by

Thomas J. Howley

Approved by Committee:

J. E. Krapfl
Chairman

W. Scott Ward

Jerry A. Carter

Dean of the School of Graduate Studies

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

The military, business and education have used cost analysis as a decision making tool. As a part of the Planning-Programming-Budgeting System (PPBS) it has enabled these operations to be quantitatively and qualitatively evaluated. PPBS has established certain necessary criterion for the application of cost analysis to a system.

According to Alexander and Messal (1972) these criteria are: (a) precisely identify the operation's goals, (b) discover less expensive alternative means of obtaining these goals, (c) select the most urgent goals, and (d) measure the performance of programs to ensure cost accountability. These specifications have greatly facilitated the operations of the military and business with respect to both effectiveness and cost.

In 1965 President Johnson activated PPBS in all government agencies. Since this time the federal government has sought for greater and more precise accountability in federally and locally funded programs. Gettings (1968) has discussed the possible applications of PPBS to mental health programming. He suggested that the additional cost necessary for effective treatment may be reviewed in terms of its long term economic value. Alexander and Messal (1972) have indicated that the mental health field has not

enthusiastically supported an accountability system. They have suggested that this lack of receptiveness by mental health professionals may be due to the conception that service oriented systems are more difficult to analyze than hardware oriented systems if they can be analyzed at all. This view and other similar conceptions may have led to the absence of cost accountability studies for mental health programs.

Alexander and Messal discussed several inadequacies in mental health programs which may need adjustment before a successful cost analysis can be performed. First, PPBS studies require that a given program have a purpose and a set of widely agreed upon objectives. Mental health specialties generally do not have similar purposes and objectives. Depending on the nature of the mental health model used, the purposes and objectives may differ tremendously.

Secondly, PPBS requires that objectives be measurable in quantifiable terms. Generally, mental health institutions have failed to establish prearranged criteria for success. Consequently, they have been unable to effectively evaluate the degree of change or amount of success obtained within mental health programs. They have limited their objectives in this area to such statements as "to increase the degree of independence" or "to assume more responsibility." Such objectives have tended not to be quantifiable or

measurable.

Finally, PPBS assumes that criteria of effectiveness be related to outcome or production. Generally, mental health treatment has been process oriented. Therapists have considered the quality and number of programs in existence as the measure of effectiveness rather than what the program actually achieved. To change to a production orientation in this area has been and continues to be a difficult transition.

However, researchers have conducted cost studies on health services (Rice, 1966) and manpower programs (Barsby, 1972). These studies dealt with gross estimates of the global costs involved in programs. What they did not seek was a cost analysis of individual programs and their effectiveness, as well as a cost evaluation of the working components of a single institution.

Don and Amir (1969) provided a cost evaluation of public and private mental health facilities in Israel. This study attempted to analyze cost by comparing the two types of facilities. A cost evaluation of an individual institution or even, an evaluation of one program was not considered.

Girardeau and Spradlin (1964) have demonstrated the simple costs involved in one program at an institution for the retarded. The study indicated only the obvious operating costs of the program. However, they did not attempt to

demonstrate the relationship between treatment cost and treatment effectiveness.

Thus a review of the literature has indicated an absence of cost studies relating to individual mental health programs. Generally, the studies which have been conducted involved national statistics over numerous programs or populations.

The present study was an attempt to devise a cost procedure applicable to a residential treatment program. This procedure was used to evaluate the relationship between cost and effectiveness of a particular program in a state institution.

Fisher (1971) identified a cost model as "an integrating device for systematically bringing together the various factors on the input side (cost categories, system configuration specifications...) and relating them to some specific type of output - oriented...capability in the future." The present study attempted to identify and relate these input factors to the output of an existing residential treatment program.

The study evaluated a behavior modification program, the requirements of which interfaced with those called for by PPBS. Both behavior modification programs and PPBS require explicitly stated observable objectives which are quantifiable and measurable. Both require a common agreement among the professionals within the institution as to

purposes and objectives. And finally both have a criteria of program effectiveness based on outcome. These conditions make a study on the relationship between the cost and the effectiveness in a mental health program possible.

The type of behavior modification program evaluated in this study was a token economy program. The program involved the total life of the residents on the ward. The night and day staff were integral components of the program with all professional team members in participation.

Token economies have been used with psychotics (Atthowe & Krasner, 1968; Ayllon & Azrin, 1968; Henderson & Scoles, 1970); with retarded (Girardeau & Spradlin, 1964; Roberts & Perry, 1970); and with delinquents (Cohen & Filipczak, 1971; Tyler & Brown, 1968) among others. Kazdin and Bootzin (1972) have surveyed the extent and critical components of token economies. The design of the token economy in this study reflects the successful components of similar token economy programs across the country.

CHAPTER II

METHOD

Subjects

The subjects for this study were 22 male and 26 female residents from two adjoining wards at Woodward State Hospital-School. The subjects ranged in age from 16 years to 62 years with a mean age of 25 years. The residents had been homogeneously grouped on these two wards by sex and functioning abilities. These functioning criteria are shown in Appendix A. Generally these residents were classified as pre-vocational and vocational candidates.

Token Economy Procedures

The design and implementation of the program were a result of a total team approach. Behavioral treatment programs are generally designed, modified and developed without the assistance of professionals other than behavior modifiers and usually do not include input from the ward personnel. Such programs, at times, tend to promote unrealistic goals and implementation strategies in the period of time projected for beginning project operation. Also, the continuance of the program, once the designers leave, is uncertain. Thus, the involvement of all professionals and non-professionals in their pertinent content areas was considered a critical component.

The development of the present program involved both professionals relatively untrained in an applied behavioral

approach and child development workers (CDW) trained in the basic principles of such an approach. A flow chart of the critical program design events was developed to assist the team. The flow chart may be found in Table 1.

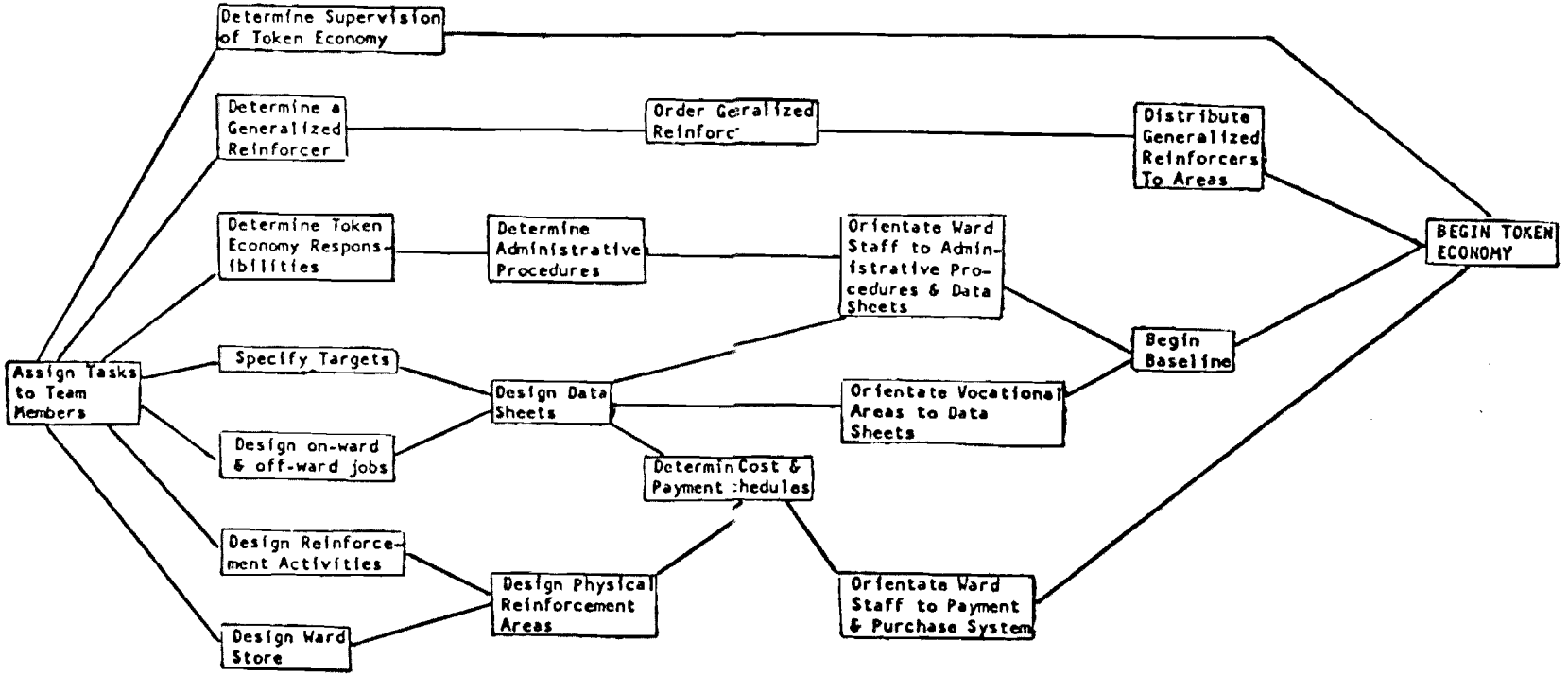
The flow chart assisted in organizing the teams efforts, developing individual responsibility for particular planning events, and encouraging individual and group accountability. An example of the flow chart operations can be shown by looking at the "Design Data Sheets" event, as shown in Table 1, which was contingent upon the "Specify Targets" and "Design on-ward and off-ward jobs" events being completed. The hospital staff responsible for the first two events were held accountable by the staff responsible for the event that followed from the first two. In this way, stalling by one member produced a stall in the entire flow of connected events. Program progress was reviewed at the weekly team meeting. This procedure encouraged peer accountability for all team members.

The team consisted of a psychologist, a social worker, two vocational habilitation counselors, a recreation aide, two LPN's, a RN, a team administrator, a behavior modification consultant, two ward charges, and approximately 16 child development workers. Each team member assisted in the design while implementation involved primarily the non-professional CDW staff.

Each of the two physical ward areas consisted of

TABLE 1

FLOW CHART OF CRITICAL EVENTS FOR BEGINNING THE TOKEN ECONOMY



one large dormitory with a capacity of 26 residents, one large living area, one unused dining room area, four side rooms, one open nursing station, and one unused nurses' office located in the connecting hallway between the two adjoining wards.

The physical space actually used to carry out the program operations consisted of the unused nurses' office, the unused dining room areas, and two side rooms. The nurses' office functioned as the commissary room and file room for program data. Edibles and other reinforcers were displayed on exposed shelving. The two side rooms were used for conducting individual projects with the residents.

The program objectives were to change those resident behaviors which were deemed necessary for independent functioning. The behaviors consisted of 27 self-care behaviors, such as teeth brushing and making one's bed, 51 on-ward work behaviors and two off-ward work behaviors. A complete list of the behaviors targeted for change is shown in Table 2.

The residents acquired tokens to be exchanged for personally valued items or events contingent upon their performance. If the resident emitted a targeted behavior, then a mark made by a rubber stamp was entered into their personal "bank books". The marks represented the number of tokens earned and would be exchanged for those items or events which the resident desired. Commodities such

TABLE 2

LIST OF TARGETED BEHAVIORS

Self-Care Behaviors

1. Got up
2. Washed face and hands
3. Dressed
4. Combed hair
5. Stripped bed
6. Brushed teeth a.m.
7. Shaved
8. Washed mattress
9. Made bed
10. Off-ward job
11. Bathed
12. Washed hair a.m.
13. Activity
14. Washed hands a.m.
15. Combed hair
16. Rest
17. Activity
18. T.V.
19. Off-ward job
20. Washed hands p.m.
21. Combed hair
22. Rest
23. Brushed teeth p.m.
24. T.V.
25. Activity
26. Bathed
27. Washed hair p.m.

On-Ward Work Behaviors

Dust mopping
1. Dorm
2. Runner
3. Rec. room
4. Living room
5. Small room

Scrubbing
6. Dorm
7. Runner
8. Rec. room
9. Small rms.
10. Restroom
11. Shower room
12. Sink
13. Toilet

Trash removal
14. Hobby room
15. Office
16. Shaking rugs
17. Replacing rugs
18. Coffee making
19. Coffee clean up

Picking up
20. Bed area
21. Housekeeping
22. After bathing
23. Clothing room
24. Rec. room
25. Living room

Furniture
26. Bed side table
27. Living room
28. Rec. room
29. Kitchen
30. Took bags down
31. Errand

Window sills
32. Dorm
33. Living room
34. Hallway
35. Rec. room
36. Small rms.
37. Time out rm.
38. Restroom

Laundry
39. Sorting
40. Towels
41. Sheets
42. Own laundry

Windows
43. Doors
44. Clothing rm.
45. Doors
46. 15 sm. panes
47. 9 lg. panes

Walls
48. Toilet rm.
49. Sink
50. Shower
51. Living rm.

Off-Ward Work Behaviors

1. Arrives on time
2. Remains the required amount of time

as tobacco, coffee, specially ordered items, watching color TV, special recreational events, trips, and other valuables were exchangeable for the tokens.

Each resident was paid immediately upon completion of any specified behavior. At 11:45 a.m. and 7:00 p.m. each day the residents spent the tokens for items in the commissary. Rentals of radios, bikes, and social and recreational events were purchasable at any time.

The paymaster responsibility was assigned by the ward charge at the beginning of each shift. The paymaster responsibilities were to check the completion of targeted behaviors, pay tokens, and record the event on the data sheet. During the paymaster's lunch or coffee break an alternate paymaster was assigned to cover the ward.

The averaged weekly percentage of self-care behaviors for all the residents were graphed separately for each ward by the night staff. The averaged weekly frequency of all the resident work tasks over both wards were also graphed. The amount of data collected in the study allows for the future review of individual resident performance on each behavior. However, the data presented here is averaged for all residents for selected groups of behaviors. The overall program effectiveness was considered a reasonable measure for evaluation.

Costing Procedures

The treatment cost was separated into direct and

indirect treatment cost, for the three phases of program development, and the cost to the ward with and without the treatment program.

The total cost of the treatment program was separated into direct and indirect treatment costs. Direct treatment cost included the salaries of the ward personnel, such as the paymaster, who actually conducted the program. Specifically these data were the paymaster's direct program time, the ward store times and the event exchange times. Indirect treatment cost included all those costs involved in the planning, designing and the modifying of the treatment program. All professional and non-professional time spent either in ward meetings or specific individual program design or review were considered within this category. Any material or physical ward change expenditure was considered as indirect treatment cost.

Total treatment cost was divided into three categories of program development. These were planning and design costs, implementation costs, and maintenance costs. Planning and design costs consisted of all preparatory events necessary to begin the first day of the treatment program. This time encompassed all program related meetings, program development, orientation of program area staff, and the baseline data collection. All expenditures related to the re-design of the physical ward area were included in this category.

The Implementation Cost category was defined as all those costs related to the initial supervisory time necessary for program operation. These costs involved consultant and extra ward meeting time needed in guiding and troubleshooting the program in its beginning stages.

The Maintenance Cost category included those costs related to the continuance of the program. These costs involved the daily operating costs for eight weeks of the program. These costs included all staff-treatment interactions related to the targeted behaviors, scheduled token economy ward meetings, night staff data graphing time, on-line supervisory time and the replacement of supplies.

The third analysis of treatment cost was a comparison of monthly ward maintenance cost with the program to the monthly ward maintenance cost without the program. These costs included the professional and non-professional cost to the ward for a one month period. All non-treatment related ward personnel and physical maintenance costs were not included in the comparison because these were constant costs.

The cost data collected was primarily staff time and equipment costs. However the data collection procedures differ for treatment cost break-outs and the comparison of monthly ward costs. Time on task data were gathered from all ward staff directly involved in the treatment program for the direct and indirect treatment cost break-out

and the break-out of the three categories of program development. The paymaster's cost was calculated by multiplying the frequency of each targeted behavior by an averaged staff-resident interaction time for that behavior. The averaged interaction time was found by the use of stop watch recordings of two observers for several days of program operation. Reliability checks of intervention time were performed for these observations.

Professional and non-professional cost data other than the paymaster was obtained from special data sheets and ward meeting notes. These staff individually recorded the related program event and time on data sheets. Ward meeting notes included the names of all staff present and the duration of the meeting.

The cost data collected for the comparison of the monthly ward cost with and without the treatment program were gathered from staff monthly objective reports and the individual staff time data sheets.

CHAPTER III

RESULTS

The results are presented in two sections. The first section considers program effectiveness data as measured by changes in resident performance on the various targeted behavior categories. The second section is composed of a summary of the costs involved in setting up and operating the program.

Program Effectiveness

Four categories of self-help skills for the women's ward are described in Figure 1. The behaviors included in each category are not necessarily functionally related to one another in the normal environment. However, earlier research in our unit has shown that for each category, the behaviors could be conceptualized as a chain of responses, all to be maintained by a single consequence since the behaviors in each category occur in a fixed sequence and all take place at the same time each day. The charts in Figure 1 and 2 indicate the weekly average percent of self-care behaviors over all residents in each ward. The behaviors included in each chart are as follows, chart a-1 is the morning routine and includes getting up from bed, washing face and hands, dressing, combing hair, and stripping bed; chart a-2 includes bathing and washing hair; chart a-3 includes washing hands and combing hair before meals; and chart a-4 includes brushing teeth after meals.

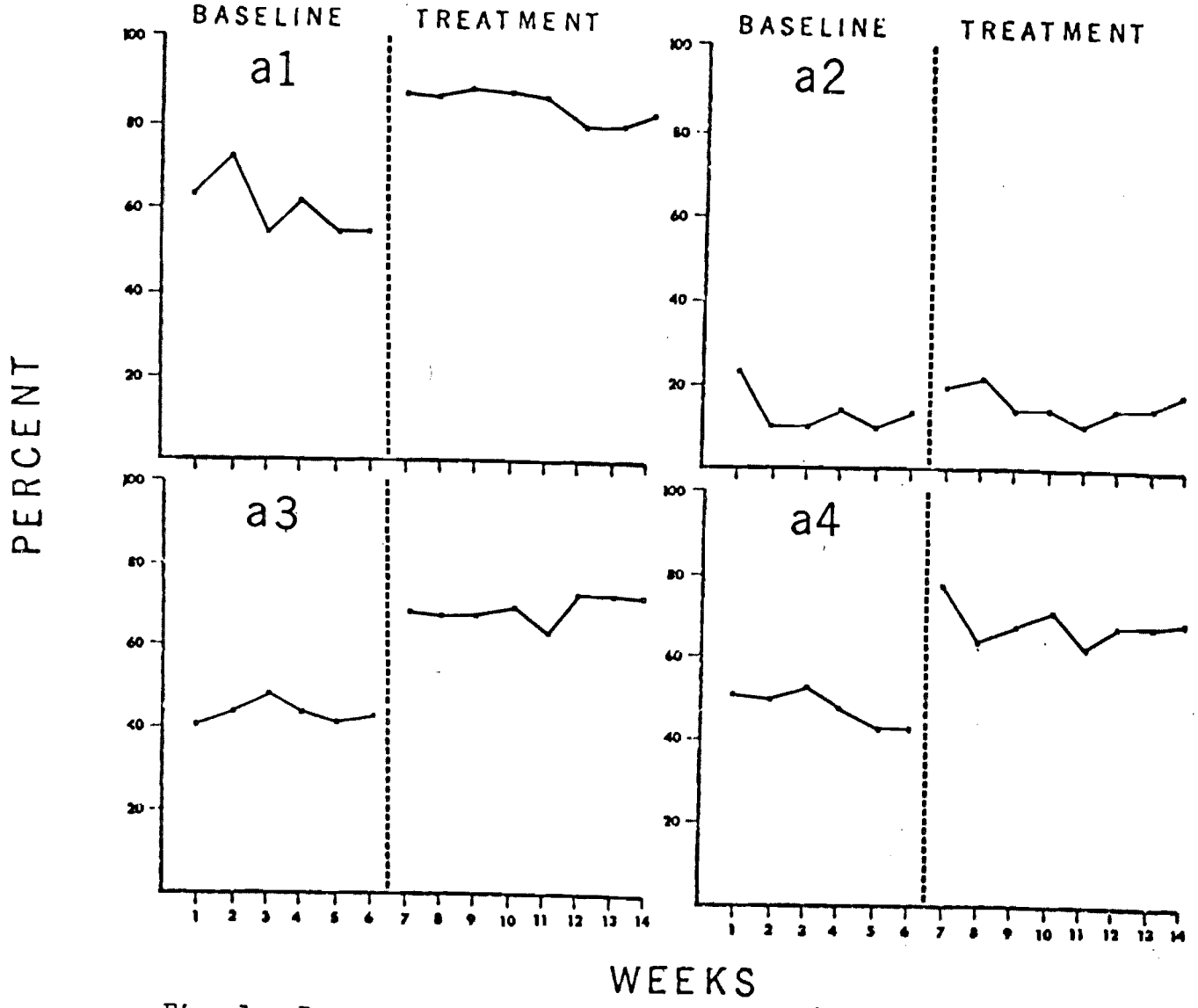


Fig. 1. Percent of Self-Help Behaviors for Women's Ward.

The behaviors shown in charts a-1, a-3, and a-4 had relatively high baseline frequencies while the behaviors composing chart a-2 ranged below 20%. All the behaviors in charts a-1, a-3, and a-4 increased in percent performed during the treatment period.

The behaviors in category a-2 did not show a significant increase during the treatment phase.

The same four categories of self-help behaviors described in Figure 1 for the women's ward are presented in Figure 2 for the men's ward.

The morning routine as shown in chart b-1 and washing hands and combing hair as shown in chart b-3 of Figure 2 showed high baseline performance but decreased considerably by the last week of baseline for reasons which are not clear. Bathing and washing, as shown on chart b-2 and brushing teeth, as shown on chart b-4 of Figure 2, occurred at low frequencies throughout the baseline period. The behaviors included in charts b-1, b-3, and b-4 showed increases in percent of correct performance during the treatment phase. B-1 and b-3 behaviors produced a stable week to week frequency during the treatment phase. The behaviors in category b-4 showed some variability during the first few weeks of the treatment period, but increased and remained stable for the remaining weeks of the project. The increase in performance following the third week was a result of extra ward meetings conducted at that time which resulted in the

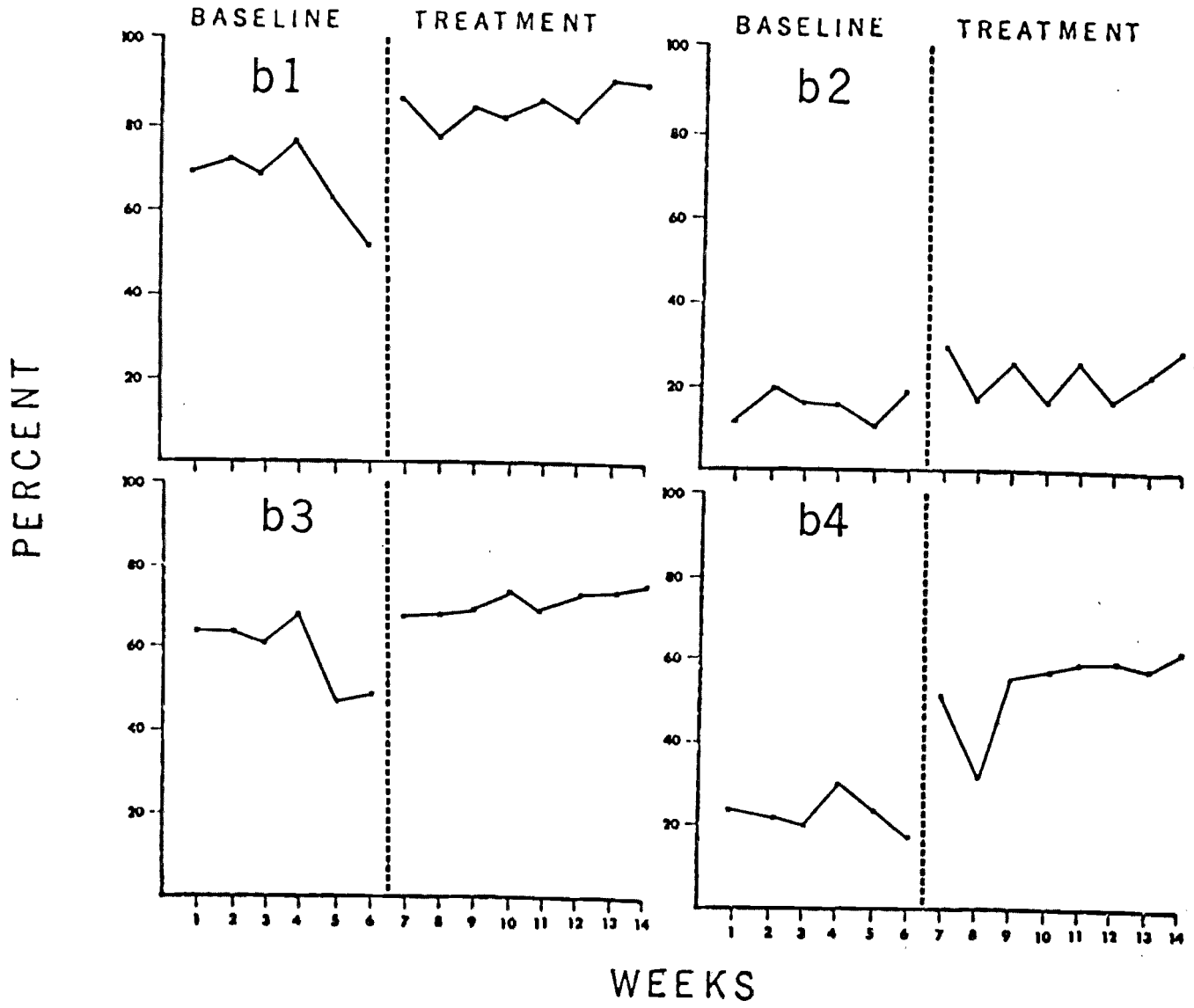


Fig. 2. Percent of Self-Help Behaviors for Men's Ward.

increase in Implementation Costs discussed in the second section of this chapter.

The treatment program demonstrated no large effect in changing the frequency of bathing and washing hair as shown in chart b-2 of Figure 2. The first week of treatment demonstrated an increase in these behaviors over the highest point obtained during baseline. However, responding became erratic for the next five weeks with a general increasing trend in the final two weeks.

Noticeable similarity was demonstrated between the men's and the women's ward baseline and treatment frequencies for the self-help skills. This finding occurred with the only experimental similarity being the program structure since both ward staffs and resident living environments were different.

The "On-ward work tasks", seen in Figure 3, showed the most dramatic changes over the baseline period. The highest point during the baseline was 370 jobs while the highest point achieved in the treatment phase was 590 jobs.

The first week of the treatment period demonstrated an increase of 200 jobs over the previous week. However, a steady decline in job tasks took place after the third week of treatment. During the fifth week of treatment jobs were at a low of 350. A steady increase followed this decline with a high of 590 jobs in the eighth week of the treatment period. As was stated for the behaviors included

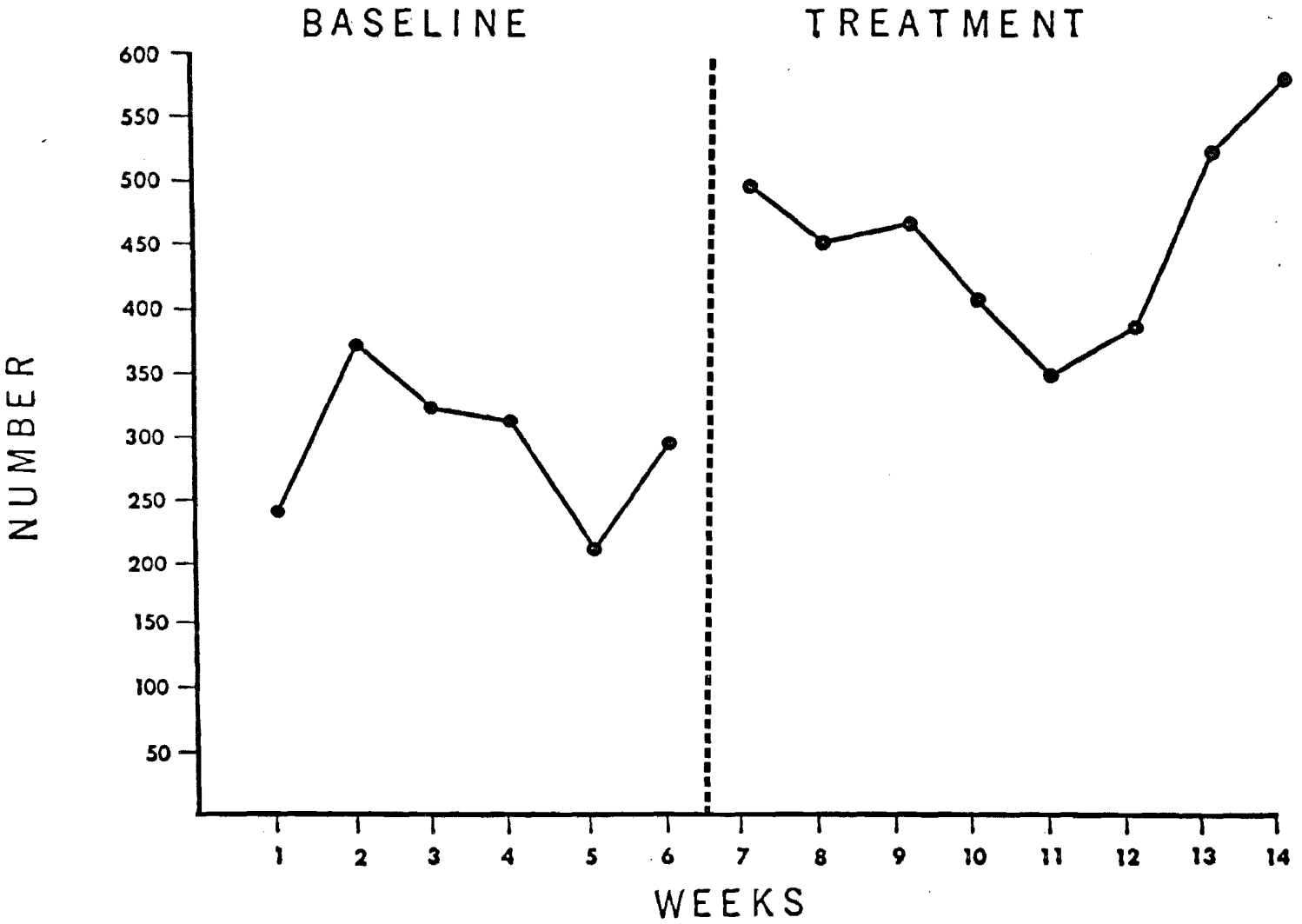


Fig. 3. Number of work tasks performed by both men and women.

in chart a-2, an increase in implementation cost occurred when special ward meetings had to be called after the third week due to a general decline in the frequency of some targeted behaviors. The subsequent increase in work behaviors coincided with these meetings.

Program Costs

Two separate analyses of cost were made on the project. The first analysis was a comparison of the monthly operating costs of the two wards prior to the program to the cost of their monthly operation during the program maintenance phase. The second analysis was an attempt to ascertain the direct and indirect costs involved in the start-up, implementation and maintenance components of the program.

The objective of the first analysis was to determine the actual increase in dollar expenditures per month which were required to maintain the program which were over and above those costs required by the very existence of the residential facilities.

Since the non-treatment costs were measured immediately prior to the inception of the project, and since there were no change in salary levels during the non-treatment or treatment periods, it was unnecessary to consider a discount rate nor to make any corrections in any costs in order to conduct the comparison.

Monthly ward costs for professional and non-professional

time during non-treatment and treatment phases are presented in Table 3. Building, food, and physical maintenance costs were constant over the two phases, therefore, were not included in the comparison. Hospital employees not affected by the treatment program also were not included in the comparison.

The largest salary cost to the ward, as can be seen in Table 3, was the Child Development Worker (CDW) time. No additional CDW staff were required for operation of the program. This fact is reflected in the CDW time remaining constant in the comparison. The supervisor's time also remained the same.

The psychologist's total hours spent on the ward were greater during the non-treatment phase than during the treatment phase. The time of the activity specialist and the LPN increased slightly in the treatment phase while the RN time remained constant. The Social Worker II position became a full time position during the treatment phase. The increase in task time of the activity specialist and the social worker were a function of their new responsibilities as a result of the treatment program. Additional consulting by the activity specialist and the obtaining of commissary items by the social worker accounted for these increases.

Supplies and equipment costs showed the only noticeable increase during the treatment phase. The total

TABLE 3

COMPARISON OF THE MONTHLY WARD COST
WITH AND WITHOUT THE PROGRAM

	Ward cost with program			Ward cost without program		
	Number of Personnel	Total Hours	Cost In Dollars	Number of Personnel	Total Hours	Cost In Dollars
Child Development Wk II	19	2656	6879.04	19	2656	6879.04
Child Development Wk III	2	320	972.80	2	320	972.80
Psychologist II	1	14	80.22	1	17	97.41
Social Worker II	1	7	28.56	0	--	---
Activity Specialist I	1	21	81.48	1	16	62.08
LPN	2	44	151.80	2	42	144.90
RN	1	14	59.92	1	14	59.92
Supplies and Equipment			265.00			
Total Cost			8438.60			8216.15

additional cost per month to the ward during treatment program was $222.45. The figures presented in Table 3 considered only program maintenance costs, and not the costs of planning and designing the economy since these are non-recurring costs and are not germane in a comparison of continuous operating costs.

This cost comparison shows clearly that most of the cost of operating the token program were, in fact, a function of resource reallocation rather than additional resource utilization.

The Input Cost Break-Out found in Table 4 describes the cost of planning and design, implementation, and eight weeks of maintenance for the treatment program. The break-out accounts for all events related to the treatment program and their costs. The three cost categories mentioned above attempt to separate program expense as a function of program development, non-recurring, and recurring costs respectively. The salary per hour, hours spent on task, and the cost per task for each staff member are noted.

In the case of the CDW II costs in the implementation of baseline phase and the implementation of modification phase, task hours were determined by multiplying the frequency of occurrence for each behavior item by an averaged resident-attendant interaction time for each task. For instance targeted behavior "getting up from bed" required an average of one minute of resident-attendant interaction

TABLE 4

INPUT COST BREAK-OUT

	Hourly Salary	Hours on Task	Task Cost
Planning and Design			
Specify Targets			
Psych. II	5.73	5	28.65
Activity Sp. I	3.88	7	27.16
Design On-Ward Jobs			
CDW III	3.04	4	12.16
Voc. Habilitation	4.08	4	16.32
Area Administrator	6.98	2	13.96
Design Reinforcement Activities			
CDW III	3.04	4	12.16
Social Worker II	4.08	1	4.08
Recreation Aide	3.55	1	3.55
Design Ward Store			
CDW III	3.04	4	12.16
Social Worker II	4.08	9	36.72
Psych. II	5.73	4	22.92
Activity Sp. I	3.88	1	3.88
Design Data Sheets			
Psych. II	5.73	6	34.38
Activity Sp. I	3.88	8	31.04
Design Admin. Procedures			
CDW III	3.04	4	12.16
Psych. II	5.73	4	22.92
LPN	3.45	4	13.80
Activity Sp. I	3.88	6	23.28
Determine Cost & Payment Schedules			
CDW III	3.04	2	6.08
Psych. II	5.73	4	22.92
Social Worker II	4.08	3	12.24
Design Physical Reinf. Areas			
Recreation Aide	3.55	0	---
CDW III	3.04	0	---
CDW II	2.59	0	---
Determine Generalized Reinforcer			
Activity Sp. I	3.88	4	15.52
Determine Supervision of Economy			
Activity Sp. I	3.88	5	19.40
Psych. II	5.73	3	17.19
LPN	3.45	2	6.90
Area Administrator	6.98	1	6.98

TABLE 4 (Cont.)

INPUT COST BREAK-OUT

	Hourly Salary	Hours on Task	Task Cost
Planning and Design (Cont.)			
Orientation to Baseline Phase			
CDW III	3.04	12	36.48
CDW II	2.59	66	170.94
LPN	3.45	2	6.90
Vocational Habilitation	4.08	3	12.24
Activity Sp. I	3.88	4	15.52
Psych. II	5.73	6	34.38
Implementation of Baseline Phase			
CDW III	3.04	60	182.40
CDW II	2.59	107	277.13
LPN	3.45	2	6.90
Vocational Habilitation	4.08	12	48.96
Activity Sp. I	3.88	48	186.24
Psych. I	5.73	2	11.46
Orientation to Modification Phase			
CDW III	3.04	14	42.56
CDW II	2.59	56	145.04
Activity Sp. I	3.88	7	27.16
Psych. II	5.73	7	40.11
Total			1682.95
Implementation Cost			
Behavior Modification Consultation			
Activity Sp. I	3.88	35	135.80
Ward Meetings			
CDW III	3.04	2.8	8.51
CDW II	2.59	8.1	20.98
Psych. II	5.73	2.3	13.18
Activity Sp. I	3.88	1.2	4.66
Social Worker I	4.08	1.0	4.08
LPN	3.45	1.7	5.87
RN	4.28	1.7	7.28
Total			200.36

TABLE 4 (Cont.)

INPUT COST BREAK-OUT

	Hourly Salary	Hours on Task	Task Cost
Maintenance Cost			
Implementation of Modification			
CDW III	3.04	82	249.28
CDW II	2.59	206	533.54
LPN	3.45	36	124.20
Social Worker II	4.08	16	65.28
Psych. II	5.73	16	91.68
Commissary Cost			
Special Services			112.00
Business Office Account			191.00
Material Costs			
Rubber Stamps			105.00
Ward Meetings			
CDW III	3.04	5.2	15.81
CDW II	2.59	16.5	42.74
Psych. II	5.73	3.5	20.06
Activity Sp. I	3.88	2.4	9.31
Social Worker II	4.08	3.0	12.24
LPN	3.45	2.9	10.01
RN	4.28	2.2	9.42
Total			1591.57
Grand Total			3474.88

time. The frequency of occurrence for the behavior was multiplied by one minute. The sum of all the resident-staff interactions were totaled. In this way CDW II hours on task for the implementation of baseline is 107 hours and 206 hours for eight weeks of implementation of modification phase.

Reliability checks on resident-attendant interaction time durations showed a reliability coefficient greater than .95 for two independent observers. These checks indicated that those items which involved the CDW moving away from the nursing area to check a behavior averaged one minute while behaviors which simply required a visual observation and check averaged one half minute. The resident-attendant interaction involved the attendant checking the behavior to determine if criterion was met, paying the resident, and recording the event on the data sheet.

All other staff recorded their time for each task performed.

A summary of the major program events are presented in Table 5. The total cost for each program event and the percent of the total category cost is shown. For instance, program event "specify targets" cost $55.81 and was 3.32% of the Planning and Design category cost.

Planning and Design costs accounted for the largest dollar cost, making up 48.43% of the total program cost.

TABLE 5

SUMMARY OF COSTS FOR THE TREATMENT PROGRAM

	Percent of Total	Cost (In Dollars)		Percent of Grand Total
Planning and Design				
Specify Targets	3.32	55.81		
Design On-Ward Jobs	2.52	42.44		
Design Reinforcement Activities	1.18	19.79		
Design Ward Store	4.5	75.68		
Design Data Sheets	3.89	65.42		
Design Administrative Procedures	4.29	72.16		
Determine Cost and Payment Schedules	2.45	41.24		
Design Physical Reinforcement Area	0	0		
Determine Generalized Reinforcer	.92	15.52		
Determine Supervision of Token Economy	3.0	50.47		
Orientation to Baseline Phase	16.43	276.46		
Implementation of Baseline	42.36	713.09		
Orientation to Modification Phase	15.14	254.87		
Total	100.00		1682.95	48.43
Implementation Costs				
Behavior Modification Consultant	67.78	135.80		
Additional Ward Meetings	32.22	64.56		
Total	100.00		200.36	5.77

TABLE 5 (Cont.)

SUMMARY OF COSTS FOR THE TREATMENT PROGRAM

	Percent of Total	Cost (In Dollars)		Percent of Grand Total
Maintenance Costs				
Implementation of Token Economy	66.85	1063.98		
Ward Meetings	7.51	119.59		
Supplies and Equipment	25.64	408.00		
Total	100.00		1591.57	45.8
Grand Total			3474.88	100.00

The largest cost within this category was the Implementation of Baseline at 42.36%. The next largest costs were the orientations to the baseline and the modification phases. All other preparatory events did not individually exceed 5% of this cost category.

Implementation cost comprised 5.77% of the total program costs. The consultant expense contributed 67.78% to the Implementation costs category.

Maintenance cost accounted for 45.8% to the total program cost. The Implementation of the Token Economy consisted of 66.85% of this category. Ward meetings accounted for the least cost.

The total cost of Planning and Designing, Implementation, and eight weeks of Maintenance was $3474.88. The largest individual cost events were the Implementation of Baseline and the Implementation of Modification.

Program cost is separated into Direct and Indirect treatment cost as detailed in Table 6. This separation of costs attempt to identify supportive treatment cost and actual treatment cost. Direct treatment cost includes all staff-resident treatment interactions. These interactions primarily involve CDW II - resident interaction time during baseline, treatment, and token exchange periods. Indirect treatment cost covers all other costs involved in the treatment program, primarily supervision and supplies costs.

TABLE 6

COMPARISON OF INDIRECT AND
DIRECT TREATMENT COST

	Indirect Treatment Cost		Direct Treatment Cost	
	Total Hours	Cost (In Dollars)	Total Hours	Cost (In Dollars)
Child Development Worker II	146.60	379.69	313	810.67
Child Development Worker III	194	589.77	---	
Psychologist II	62.8	359.84	---	
Social Worker II	33	134.64	---	
Activity Specialist I	128.60	498.98	---	
LPN	50.60	174.58	---	
RN	3.90	16.70	---	
Area Administrator	3	20.94	---	
Vocational Habilitation	19	77.52	---	
Recreation Aide	1	3.55	---	
Equipment and Supplies		408.00	---	
Totals		2664.21		810.67
Grand Total			3474.88	

CDW II time was considered the only direct cost to the program. This cost is the single largest cost in the study. CDW II cost in Indirect treatment was primarily composed of ward meetings and night staff charting time.

CDW III's accounted for the greatest number of hours and the largest cost under the Indirect Treatment Cost category. The professional's costs ranged from a high of $498.00 for the Activity Specialist to a low of $3.55 for the Recreation Aide.

The total program cost was $3474.88 as seen in Table 5. The average daily cost of the two wards for eight weeks of treatment was $62.00. The average cost per individual project per day was $.08.

The total cost figure includes program planning and design, and implementation costs. These cost components were one time expenditures and thus as the program continues the average daily cost will be less.

CHAPTER IV

DISCUSSION

The study was successful in assessing the cost and evaluating the effectiveness of a treatment program designed and implemented by professionals and non-professionals of several disciplines working together. The various cost break-outs of the program indicate that: (a) professional and non-professional staff time is primarily a reallocated cost within the system; (b) the only major additional cost to the system is supplies; (c) professional planning time is a minimal cost to the system; (d) non-professional implementation cost is the largest cost; (e) the initial investment cost in consulting and supervising is a minimal cost; (f) CDW cost is the only direct cost to the system; and (g) the total dollar cost for operating a large number of treatment projects in the program is relatively small.

Effectiveness data indicated that the treatment program was effective in changing a number of resident behaviors. Thirteen of the 15 self-help skills increased in frequency and a large increase in work tasks was produced.

The following discussion will include: (a) the logic for each cost break-out; (b) evaluation of certain findings; (c) problems encountered in data collection; (d) decisions which can be made from the data; and (e) suggestions for future studies.

The purpose for the comparison of the total ward cost under treatment and non-treatment conditions, described in Table 3, was to determine the amount of additional expenditures required to run a program, and the extent to which a program might operate with only a reallocation of existing resources. The amount of child development worker time and the amount of direct supervisory time did not increase under treatment conditions. The CDW cost to the ward was the same although during the treatment phase their responsibilities increased. The amount of time spent on the ward by the professional staff generally increased, though much of their time, too, can be accounted for in terms of time reallocation.

The apparent ease with which the CDW's were able to perform their new responsibilities may indicate the existence of "slack time" in their previous job schedules. The fact that there were no reports of a decline in other scheduled attendant tasks may support this notion, though no such reports were actively solicited.

As was seen in Table 3, the psychologist's cost to the ward was greater during the non-treatment period. This may be explained by the fact that her individual resident contacts were greater during the non-treatment period while in the token economy program her responsibilities primarily involved planning in ward meetings.

The small increase in LPN time may be attributed

to her lack of progress in assuming greater participation in the supervision of the system. The RN was new to the hospital and had not yet become fully oriented to the system. The design of the treatment program specified the RN and LPN as the main supervisors of the program. Thus, it was anticipated that their program related time would increase, and presumably, result in greater program cost effectiveness.

It should be emphasized that Table 3 describes the maintenance cost of ward routine and not the costs incurred in the development of the routine.

The validity of the professional time data collected constituted a major problem for this study. The professionals collected their own time data by recording their time spent on the treatment program on special data sheets. Periodic checks with these professionals sometimes revealed either that they did not have the data sheets with them or that they had not kept them up to date. Two of the five professionals recorded their time data religiously but the time data for the other three, listed in Table 3, were taken from monthly objectives. These monthly objectives were filled out at the end of the calendar month from any raw data available to them, and may not have been as accurate.

Each critical event cost and contributing staff time expenditure is shown in Table 4. Activity reinforcement

areas were not developed as can be seen in Table 4. These areas generally refer to game rooms, TV rooms, and other general activity rooms. Activities as reinforcers for retarded and normal adults have been demonstrated as indicated by Kazdin and Bootzin (1972). However, the professional and non-professional staff selected for this task chose not to use these activities in a contingent manner. If playing in the activity areas is valued by the residents, then we have available a relatively inexpensive and reuseable reinforcer which can be made contingent upon resident performance of targeted behaviors. Reinforcers accounted for a sizeable portion of the total additional costs incurred by implementing the treatment program. The use of activities as reinforcers would have reduced this cost significantly.

Relatively few hours were spent in supervising of the economy by the nursing staff. LPN time was particularly low although supervision of the system was their responsibility. The additional supervision and additional ward meetings required in the third week, as noted in the Implementation Cost category, was related to the lack of supervision by the LPN.

The categories, Planning and Design, Implementation, and Maintenance, shown in Table 5, attempt to provide three types of information. These are: (a) how much does it cost to plan and design the treatment system, (b) how much

initial investment is necessary to start an effective and continuing system, and (c) how much investment is required to maintain the system.

Orientation and Implementation of baseline made up 74% of Planning and Design costs. All other design events were minimal costs to the system. This data suggests that some design events, such as the design of ward store and design of data sheets, may not require as much planning as was done in this project. This can be the case provided that the program operation is flexible enough to allow for continuous redesign, and solving problems as they arise, as was the case in this study. However, the need for additional ward meetings and supervision as noted under Implementation Costs may indicate that more time and cost should have been spent in the planning and design components concerned with the training of supervisors.

Implementation of the token economy was the largest cost in the Maintenance category. However, all of the components of this category were reallocations of staff time. Supplies and equipment were the largest additional costs to the institution.

The category of Indirect and Direct treatment cost for the program assists in identifying supportive program costs such as consultation and supervision which could then be compared to the actual direct costs of intervention. Direct costs to the program were the CDW II - resident

interactions, while indirect cost were all components which encouraged these interactions to occur. Direct cost components are only those which directly effect behavioral change of residents. Supervisors and professionals tend not to affect resident behavior change but they do tend to affect attendant (CDW) behavior change.

It is expected that Direct Treatment cost will remain constant over time. However, certain Indirect Treatment costs will decrease. Psychologist II and Activity Specialist I costs should reduce as LPN and CDW III supervisory skills increase. Social Worker II and Recreation Aide time will remain constant since they provide necessary continuing support to the program.

An important factor lending support to the belief in the token economy system's effectiveness was its ability to accept new resident admissions into the program. The nine new residents were lower functioning than the residents originally worked with in the beginning of the program, yet the percentages of self-help skills showed an increase over weeks. They are, in fact, conservative representations of the amount of behavior change.

Work behaviors increased dramatically over the highest point achieved during the baseline phase. After the third week of the treatment program the number of work behaviors decreased but gradually increased beginning in the sixth week of the program.

A major cause for this decrease was the placement of several male residents on off-ward jobs. These resident's work behaviors increased sharply in the beginning of the program. Their subsequent placement to off-ward jobs may have been facilitated by the stable increase in their activity as well as the team members efforts to place them. One resident earned 30 tokens a day more than any other resident. Prior to the inception of the program this resident's placement to a job was politely characterized as temporary. However, two months after his most recent placement his performance was considered stable.

This data suggests not only that the treatment program had a measurable effect on resident's targeted behaviors but that it may have indirectly supported behaviors not specifically targeted in the program.

This study holds several implications for the system purchaser. The system purchaser may be the hospital administrator, the area chief, or the director of social services, who makes decisions on the continuance of the programs.

Table 3 provides information on new and reallocated costs of the treatment program. The cost figures indicate that the actual additional costs to the institution are relatively small. The reallocation of staff responsibilities did not negatively effect existing programming nor did it require new staff. This information should indicate to the system purchaser that: (a) only a slight budget

increase is necessary to support these treatment programs, (b) the new responsibilities of the staff do not cause financial or physical strain to ongoing programs, (c) a large number of effective resident projects can be carried out with these programs.

The system purchaser, particularly the institution administrator and the area chief, can obtain specific salary and personnel cost of the program from Table 4. The use of CDW II workers to conduct treatment has obvious financial as well as functional advantages. Developing nursing service personnel such as LPN's and CDW III's as treatment supervisors rather than exclusively relying on psychologists and other high salary professionals have notable budget and service implications.

Budgetary information involving one-time and recurring costs are provided in Table 5. The relationship between Planning and Design Costs and Implementation Cost has been noted. The decision maker would be interested in how much outlay is necessary for planning and training of staff and initial consultation services. It was noted that institutional planning and consultant expense was very slight. It was also noted that additional expense in terms of extra ward meetings was necessary to correct flaws in the system. This information may indicate to the administrator that more funds are necessary in the planning and design stage. However, the most important information provided

in Table 5 concerns the Maintenance costs. This cost category indicated that supplies and equipment cost require additional institutional budget consideration. All other Maintenance costs are reallocated costs and require no increase in the budget.

Some of the institutional decisions made possible from this study may have been achieved with less effort. Staff time necessary for program development and maintenance, without the related dollar cost, would have reflected the data on staff reallocation. What is gained is in the number of decisions possible as seen in the dollar cost of non-professionals conducting treatment. The hourly cost of the psychologist is two and a half times the cost for the CDW. The collection of task time without its representative dollar cost would not have given this information.

Future cost studies in this area may need to develop more comprehensive data collection procedures. As was noted earlier the collection procedure for obtaining professional time data was questionable. A possible solution may be to obtain the correlation of estimated data and empirically determined time data. If the estimated time data reasonably reflects the actual time then such a procedure would be feasible and cost effective.

The collection and calculation of paymaster time on task data may indicate a similar problem in validity.

The stop watch recordings of each paymaster - resident interaction time may be too fine a measurement and not reflect true time expenditure. These interaction times did not include the time interval between interactions which makes up a large part of the paymaster's time. Costing out the total salary of the paymaster may be adequate as well as easier to obtain. A correlation of the total paymaster salary with the paymaster - resident interaction times would indicate if this procedure were empirically valid.

This study presented data which demonstrates that a service oriented program can be evaluated in terms of effectiveness and cost. The dependent variables for evaluating program effectiveness were the 15 self-help skills and 51 work task behaviors. The treatment program had a measurable effect in increasing a majority of these behaviors. However, specifying individual resident behaviors as the criteria for assessing program effectiveness is not adequate as a measure of output for the system. Resident movement to an advanced ward or movement into the normal community should be the dependent variable to reflect program effectiveness. This study used behavior change, rather than resident movement, as the dependent variable because resident movement studies require long term investigation. It seemed more efficient to derive a satisfactory costing system prior to a long term investigation.

The cost analysis showed that the major costs of this type of programming are simple reallocations of existing resources. This was undoubtedly due, in part, to the fact that non-professionals were effectively used to limit program costs. The study showed that additional costs for implementing the system were relatively small, and further possible reduction were suggested. The major dependent variable for the cost evaluation was staff time on task. This data included only the specific time durations involved within a task or resident - attendant interaction related to the program. This data did not include the staff time on a non-program related task or staff time not on any task.

An effectiveness criteria based on output and a complete account of the distribution of staff time might provide a more accurate description of the effectiveness and cost of a treatment program.

REFERENCES

Alexander, J. B., & Messal, B. A. The planning-programming-budgeting system in the mental health field. Hospital and Community Psychiatry, 1972, 23 (12), 357-361.

Atthowe, J. M. & Krasner, L. Preliminary report on the application of contingent reinforcement procedures (token economy) on a "chronic" psychiatric ward. Journal of Abnormal Psychology, 1968, 73, 37-43.

Ayllon, T., & Azrin, N. H. The token economy: a motivational system for therapy and rehabilitation. New York: Appleton-Century-Crofts, 1968.

Barsby, S. L. Cost-benefit analysis and manpower programs. Massachusetts: D. C. Heath and Company, 1972.

Cohen, H. L., & Filipczak, J. A new learning environment. San Francisco: Jossey-Bass Inc., Pub., 1971.

Don, Y., & Amir, Y. Institutions for mentally retarded in Israel-cost structure and budget analysis. Mental Retardation, 1969, 7 (3), 36-39.

Fisher, G. H. Cost considerations in systems analysis. New York: American Elseview Publishing Co., Inc., 1971.

Gettings, R. M. Mental retardation and the planning-programming-budgeting system. Mental Retardation, 1968, 6 (6), 24-26.

Girardeau, F. L., & Spradlin, J. E. Token rewards in a cottage program. Mental Retardation, 1964, 2 (6), 345-351.

Henderson, J. D., & Scoles, P. E. A community based behavioral operant environment for psychotic men. Behavior Therapy, 1970, 1, 245-251.

Kazdin, A. E., & Bootzin, R. R. The token economy: an evaluative review. Journal of Applied Behavior Analysis, 1972, 5, 343-372.

Rice, D. P. Estimating the cost of illness. USPHS Health Economies Series No. 6, Washington, D. C. Government Printing Office, 1966.

Roberts, C. L., & Perry, R. M. A total token economy. Mental Retardation, 1970, 8 (1), 15-18.

Tyler, V. O., & Brown, G. D. Token reinforcement of academic performance with institutionalized delinquent boys. Journal of Educational Psychology, 1968, 59, 164-168.

APPENDIX A

ENTRANCE CRITERIA FOR WARDS

Self-Help Skills

1. Feeds self with spoon, unassisted
2. Has no toilet accidents during the day
3. Buttons buttons/zips zippers
4. Washes/dries hands with soap - can leave some dirt to qualify
5. Brushes teeth without physical assistance - can leave some food in teeth to qualify
6. Combs hair - can do a poor job to qualify
7. Bathes or showers unassisted - can leave some dirt to qualify

Recreation/Social Behavior

1. Says "Hi", "hello" when appropriate
2. Holds two-way conversation with peers for at least a 2 minute period
3. Avoids kissing, hugging, or holding hands with visitors and/or strangers
4. Helps with simple ward tasks or errands if asked

Language Functioning

1. Uses phrases which contain verb and subject (go potty)
2. Can match at least 5 written words with objects (includes names of people)

Vocational Requirement

1. Has a on-ward or off-ward job assignment